Point Reyes National Seashore
Fall 2003 Horseback Tule Elk Census, Tomales Point

Robert Atkinson, Biological Technician
Natalie Gates, Wildlife Biologist

Summary:

Three elk censuses were conducted at the Point Reyes National Seashore (PRNS) Tomales Point Tule Elk Reserve during the fall of 2003. The census crew consisted of observers on horseback and in a NPS boat. Horseback observers surveyed predefined sectors while the boat observers surveyed the Tomales Bay shoreline. Observers counted and classified elk into one of 5 age and sex classes. The highest count was 386 elk, 30 fewer than the highest count of 2002. Since 2002, cow numbers have remained stable, calves have increased, and bulls have decreased. Low calf numbers in 2002 and high calf mortality rates likely contributed to lower yearling male (spike) numbers. Poaching is a possible cause of decreased branch-antlered bull numbers but additional research, and assistance from Law Enforcement, are required.

Methods:

The PRNS Tomales Point Tule Elk Reserve was divided into 3 sectors using the same boundaries as in the third 2002 census (Atkinson 2002). The boundary between the north and middle sectors was an east-west line from the ocean to the trail approximately 0.25 miles north of exclosure OGL1, continuing as a northeast line to Tomales Bay. The boundary between the middle and south sectors was an east-west line along the McClure's Beach trail and Pierce Point Road to the Upper Pierce Ranch parking lot, continuing as a northeast line through the water tank to Tomales Bay. The elk fence was the southern boundary of the south sector (see map, Figure 1).

A pair of observers on horseback surveyed each of the 3 sectors except during on October 10, 2003, when only one horseback observer surveyed the north sector. The middle and south sector observers began their surveys in unison along the eastern part of the mutual boundary line. This allowed them to monitor elk that might move across the boundary and reduced the possibility of double-counting. The north sector observer(s) surveyed north to south, eventually meeting the middle sector observers at the north/middle boundary line. Observers attempted to count and classify all elk within their sectors by surveying all accessible areas. Areas that were too brushy to travel were surveyed from a distance, usually from a high elevation vantage point. A law enforcement ranger boat was used to count elk on the Tomales Bay shoreline and on bayside slopes that were not visible to observers on horseback.

Three censuses were conducted: one in late September, one in early October, and one in early November. Each observed elk was classified as either: cow, calf, spike (male with 1 point per antler), raghorn bull (male with 2-4 points per antler), or prime bull (male with 5 or more points per antler). The location and time of each observation was recorded on 1:24,000 topographical maps. A few elk that could not be classified from the boat were labeled "unknown". Observers recorded data using pocket tape recorders, pocket notebooks and maps. Sightings of black-tailed deer, coyotes, bobcats, and elk carcasses were recorded by some, but not all, observers.

Results:

A total of 378, 386, and 384 elk were counted during the 3 censuses (Table 1). The highest count yielded 241 cows, 50 calves, 4 spikes, 10 raghorn bulls, 77 prime bulls, and 4 unknown elk. The mean calf to cow ratio (c:C) was 0.21 and the mean bull to cow ratio (B:C) was 0.38 (Table 2). The results of all 3 censuses were fairly consistent, varying by only 8 elk total from census to census, and by no more than 10 elk within each sex or age class.

A one-day maximum of 7 black-tailed deer, 2 coyotes, and 1 bobcat was recorded. Riders discovered 4 elk carcasses.

Weather varied between the 3 censuses (see Table 1). The first count, which was conducted a day after temperatures neared 100° F, was clear and warm in the morning, changing to fog and wind by early afternoon. The weather for the second count was similar except that no fog appeared and the afternoon winds were very strong. The weather for the third count was partly cloudy, calm, and cold for the entire day.

Discussion

The highest count of 386 elk for 2003 should be considered a minimum population size for Tomales Point. It is unlikely that elk were double-counted because of the boundaries of the census sectors, the survey methods, and the ability of riders to move without disturbing elk. It is almost certain that an unknown number of elk in brushy drainages were not counted. Best guess estimates from past year censuses suggest that 15 to 25 elk, mostly males, were missed (Gates 2000 & 2001).

The highest counts for censuses from 1999 through 2003 were conducted using almost identical methods, under similar weather conditions, at the same time of year (except for 1999), and with observers of similar experience (Atkinson 2002, Gates 2000 and 2001, Kucera 1999). It would seem reasonable to assume that similar proportions of elk were missed and/or misclassified from year to year. Consequently, year-to-year trends observed between the highest counts should be generally representative of population trends .

The highest count this year was 30 less than that of 2002, yielding a one-year growth rate (λ) of 0.93 (see Table 2). This figure reflects a continuation of the slow population decline observed for the past 3 years. Cow numbers were unchanged from 2002 to 2003 while calf numbers increased by 67% producing a c:C ratio similar those of 2000 and 2001. This marked increase could be viewed as a rebound from extremely low calf numbers in 2002. The total number of bulls decreased 37% between 2002 and 2003; spikes decreased by 78% while the number of branch-antlered bulls decreased by 31%.

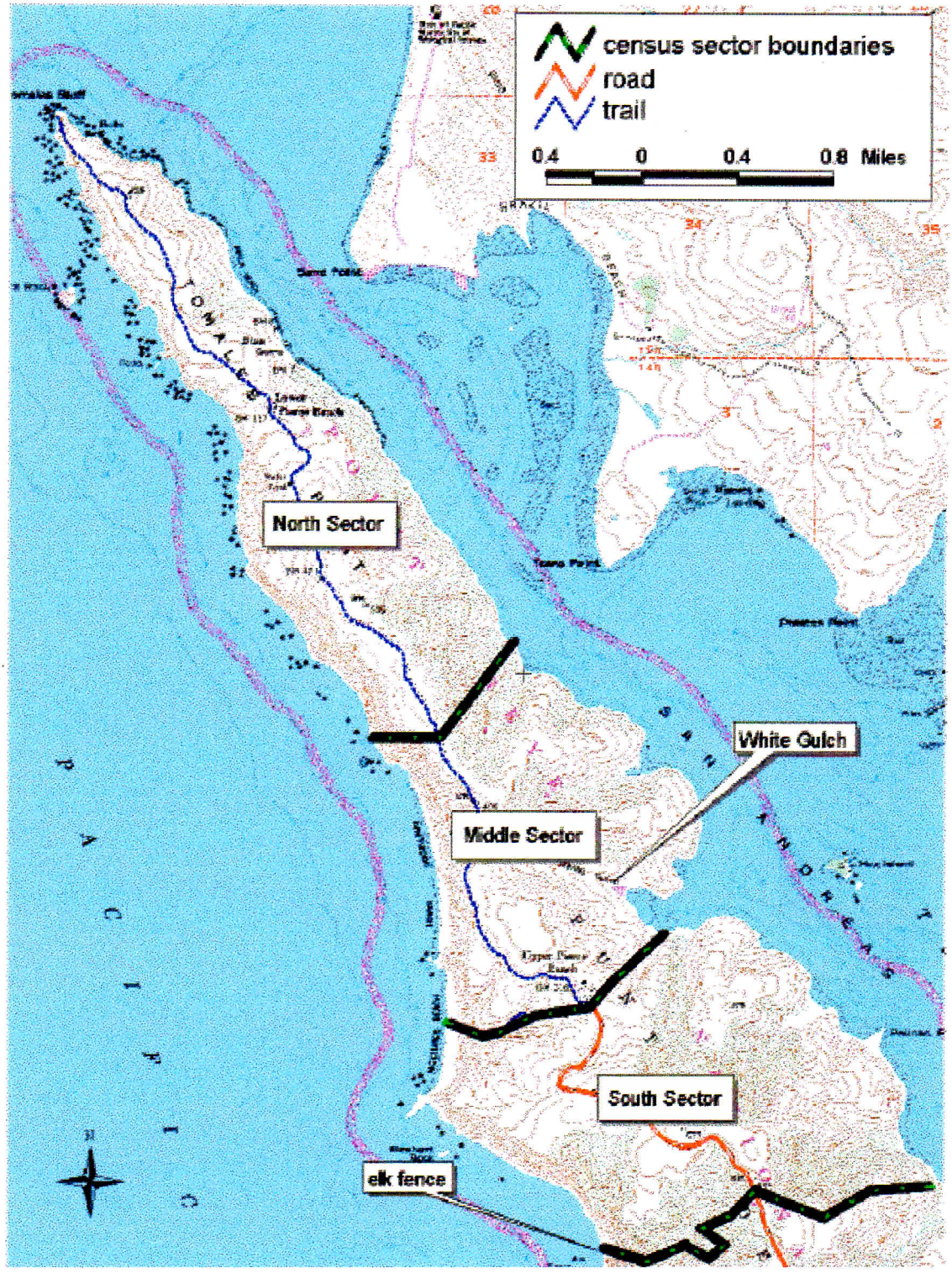
The sharp decline of spikes in 2003 appears to be a result of low 2002 calf numbers and high first-year mortality. 2002 calf numbers were 40% less than in 2001 and 50% less than in 2000. The mortality rate of 6 radio-collared elk born in 2002 was 67% for the period between November 2002 and November 2003 (Atkinson 2002). If a 50:50 sex ratio at birth is assumed for 2002 calves (McCullough, 1969), along with a 67% mortality rate for the 30 calves born in 2002, then 5 spikes would be expected in 2003. This figure approaches the number of spikes (4) counted this year, and suggests that a high first year male mortality rate of 67% is a reasonable

estimate for 2002-2003. Because yearling females and older cows cannot be reliably differentiated in the field, an estimate of female calf mortality could not be made (Gates 2001).

There are few logical reasons, besides male-specific harvest, for branch-antlered bull numbers to decrease while calf and cow numbers grow or remain stable, as they did in 2003. It seems unlikely that observer bias, with bulls being undercounted more than cows and calves, is the cause. Bulls do tend to forage singly, in high brush, making them more likely to be missed. This behavior is seen year-round but especially during the non-rut season. The 3 census dates spanned the pre-rut, peak rut and post-rut seasons and bull totals did not vary by more than 6 from census to census. This suggests that lone, foraging bulls were not missed by observers in numbers large enough to account for the discrepancy between 2002 and 2003 (59 fewer bulls in 2003).

Poaching could result in significant changes in bull numbers. Since January 2002, Wildlife staff and volunteers have opportunistically discovered 5 bull carcasses with sawed antlers, skulls, and removed canines (Gates, personal communication, see Figure 2). Saw marks were found in each case and it seems unlikely that missing items were removed by casual visitors (see Figures 3 and 4). Efforts to ascertain causes of death, using standard necropsy equipment and metal detectors, were unsuccessful. There is easy boat access to a number of areas used heavily by mature bulls and it is conceivable that entire bull carcasses may have been removed from the reserve. It is hoped that coordination between the Wildlife Branch and Law Enforcement Division over the next year will lead to a better understanding of the level of poaching that might be occurring at Tomales Point. In addition, an elk monitoring study supported by USGS-BRD, U.C. Berkeley and NPS, and scheduled to begin in FY 2005, should shed light on sex- and age-specific elk survival, in both the Tomales Point and Limantour herds.

Figure 1: Census sector divisions for the Tomales Point elk reserve, Point Reyes National Seashore.



Point Reyes National Seashore
12/05/03
Atkinson and Gates

Figure 2:

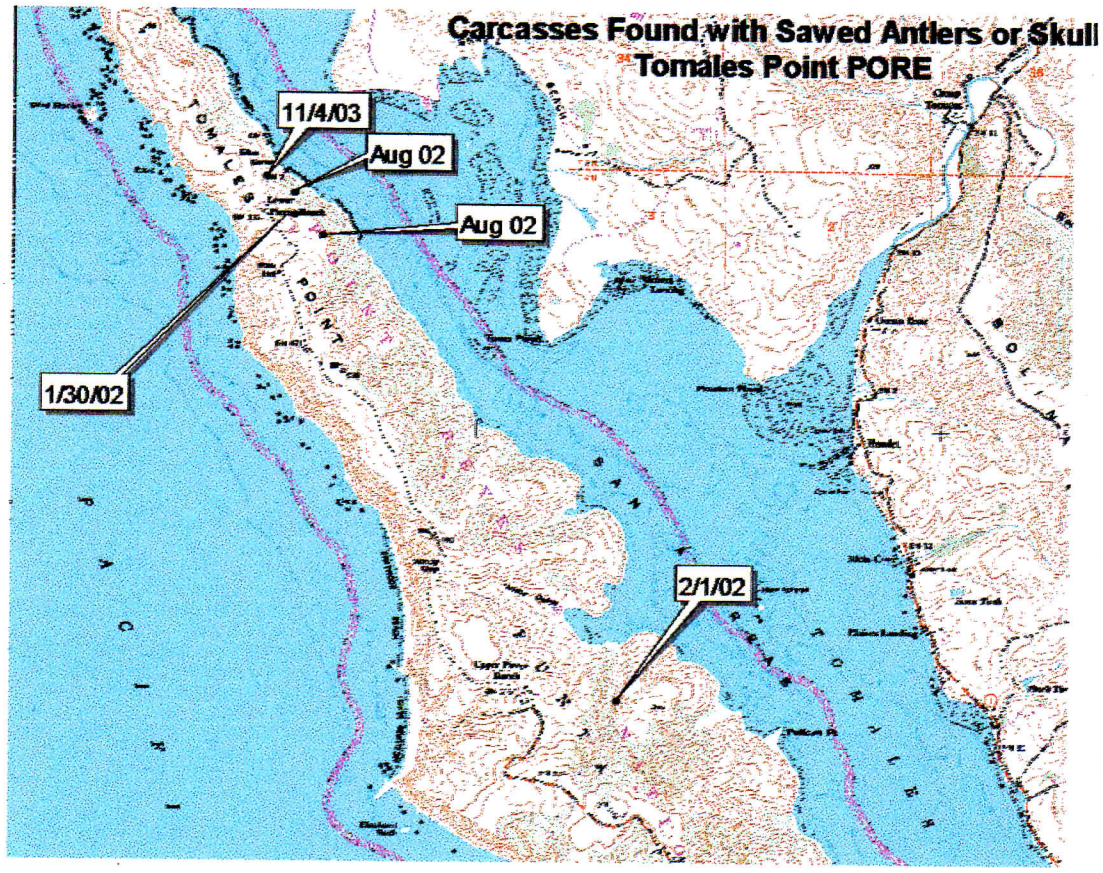

Carcasses Found with Sawed Antlers or Skull
Tomales Point PORE
11/4/03
Aug 02
Aug 02
1/30/02
2/1/02
TOMALES
POINT
PACIFIC
OCEAN
SAN
FRANCISCO
BAY

Figure 3: Carcass discovered 2/4/2002, near Upper Pierce Ranch (antlers sawed off at base)

Figure 4: Carcass discovered 11/4/2003, Lower Pierce Ranch (entire calvarium removed)

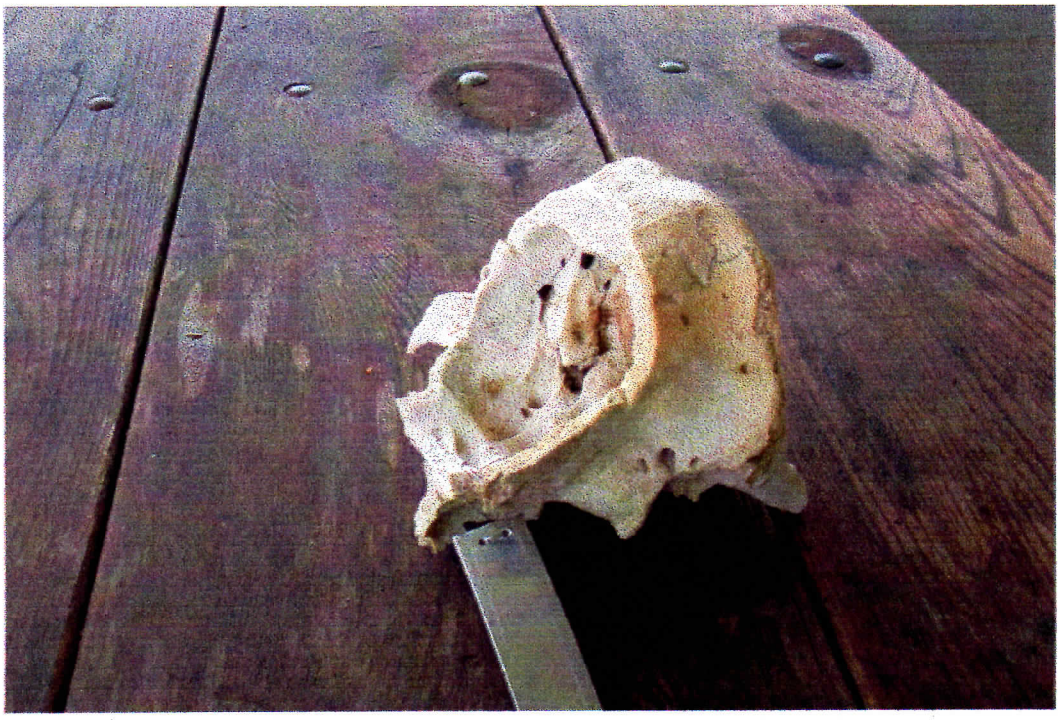


Table 1: Elk census results for 2003 for the Tomales Point elk reserve..

September 23, 2003 — Weather: sunny, warm changing to windy fog by 14:00

	Observers	Total	Cows	Calves	Spike Bulls	Raghorn Bulls	Prime Bulls	Total Bulls	Unknown	Calf:Cow	Bull:Cow
South	Binney, Kohn	106	53	8	0	9	35	44	1	0.15	0.83
Mid	Atkinson, Atwood	135	101	22	0	0	12	12	0	0.22	0.12
North	Gates, Geritz	137	82	17	2	9	27	38	0	0.21	0.46
Total		378	236	47	2	18	74	94	1	0.20	0.40

October 10, 2003 — Weather: clear all day; calm and warm in a.m. changing to very windy and cool by noon

	Observers	Total	Cows	Calves	Spike Bulls	Raghorn Bulls	Prime Bulls	Total Bulls	Unknown	Calf:Cow	Bull:Cow
South	Binney, Geritz	109	59	14	1	3	32	36	0	0.24	0.61
Mid	Atkinson, Stone	121	91	19	0	3	8	11	0	0.21	0.12
North	Gates	156	91	17	3	4	37	44	4	0.19	0.48
Total		386	241	50	4	10	77	91	4	0.21	0.38

November 4, 2003 — Weather: partly cloudy, calm, and cold all day

	Observers	Total	Cows	Calves	Spike Bulls	Raghorn Bulls	Prime Bulls	Total Bulls		Calf:Cow	Bull:Cow
South	Binney, Gregorio	139	77	19	1	2	40	43	0	0.25	0.56
Mid	Atkinson, Hadland	83	70	10	0	0	3	3	0	0.14	0.04
North	Gates, Geritz	162	88	23	6	6	39	51	0	0.26	0.58
Total		384	235	52	7	8	82	97	0	0.22	0.41

Table 2: Highest elk censuses of each year from 1999-2003 for the Tomales Point elk reserve.

date	λ[1]	total elk	cows	Calves	spike bulls	branch antler bulls	total bulls	calf:cow	bull:cow	Reference
Nov 23 1999	--------	476	210	92	------	---------- ----	174	0.44	0.83	Kucera, 1999
Oct 11 2000	0.95	451	260	61	17	113	130	0.23	0.50	Gates, 2000
Oct 18 2001	0.94	423	254	50	22	94	116	0.20	0.46	Gates, 2001
Oct 22 2002	0.98	416	241	30	18	127	145	0.12	0.60	Atkinson, 2002
Oct 10 2003	0.93	386	241	50	4	87	91	0.21	0.38	This document

[1]Year to year growth rate (Nt /Nt-1)

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